

REMARKS

Claims 1 and 5 have been amended. It is respectfully submitted that such an amendment would not alter the scope of the present search and, thus, would not likely require a new search by the Examiner. Specifically, original claim 14 was directed towards using a phase based scatterometry technique, and the current amendments to claim 1 merely clarify such a phase based technique. Claims 13-14 have been cancelled. Claims 1-10 and 12 remain pending.

Figure 3b is herein submitted to correct a formatting error.

It is noted that the Examiner has deemed that claims 5-6 would be allowable if rewritten into independent form including all of the limitations of the base claim and any intervening claims. Accordingly, claim 5 has been amended into independent form including all of the limitations of the base claim.

Claims 1-3, 12, and 13 are rejected under 35 U.S.C. §102(e) as being anticipated by Yang et al. (U.S. Patent 6,982,793). The Examiner's rejections are respectfully traversed as follows.

Claim 1 is directed towards a method of determining an overlay error. Claim 1 also recites "for each of a plurality of periodic targets target that each have a first structure formed from a first layer and a second structure formed from a second layer of the sample, measuring a plurality of optical signals at a plurality of incident angles, wherein there are predefined offsets between the first and second structures." Claim 1 further recites "determining and storing, in memory, an overlay error between the first and second structures by analyzing the measured optical signals at the plurality of incident angles from the periodic targets using a scatterometry overlay technique based on the predefined offsets without using a calibration operation or a model-based regression technique." Claim 1 further recites "wherein the scatterometry overlay technique is a phase based technique that includes representing each of the measured optical signals as a periodic function having a plurality of measured, known parameters, which are obtained from the each measured optical signal, and an unknown overlay error parameter and analyzing the set of periodic functions to solve for the unknown overlay error parameter to thereby determine the overlay error."

This phase based scatterometry technique is preferred in some circumstances, depending on variables that include scatterometry overlay target pitch, scatterometry overlay target design, scatterometry overlay (SCOL) target materials, the measured scatterometry signal, and the like. See Page 30, first paragraph of the current specification, for example.

Although the primary reference Yang appears to be directed towards determining overlay by analyzing optical signals measured from targets having offsets, it is respectfully submitted that the teachings of Yang are based on a linear scatterometry technique. See, for example, Equations 5 in Col. 5 and Equation 8 in Col. 16. That is, Yang fails to teach or suggest determining an overlay error using a phase based scatterometry technique “that includes representing each of the measured optical signals as a periodic function having a plurality of measured, known parameters, which are obtained from the each measured optical signal, and an unknown overlay error parameter and analyzing the set of periodic functions to solve for the unknown overlay error parameter to thereby determine the overlay error.” For the forgoing reasons, it is respectfully submitted that claim 1 is patentable over the cited art.

The Examiner’s rejections of the dependent claims are also respectfully traversed. However, to expedite prosecution, all of these claims will not be argued separately. Claims 2-10 and 12 each depend directly or indirectly from independent claim 1, therefore, are respectfully submitted to be patentable over cited art for at least the reasons set forth above with respect to claim 1. Further, the dependent claims require additional elements that when considered in context of the claimed inventions further patentably distinguish the invention from the cited art.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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